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METHOD AND APPARATUS FOR EARLY PRESENTATION OF EMPHASIZED REGIONS IN A WEB PAGE

BACKGROUND OF THE INVENTION

1. Technical Field:

The present invention generally relates generally to an improved data processing system, and in particular to a method and apparatus for presenting selected regions in a web page.

2. Description of Related Art:

The Internet, also referred to as an "internetwork", is a set of computer networks, possibly dissimilar, joined together by means of gateways that handle data transfer and the conversion of messages from the sending network to the protocols used by the receiving network (with packets if necessary). When capitalized, the term "Internet" refers to the collection of networks and gateways that use the TCP/IP suite of protocols.

The Internet has become a cultural fixture as a source of both information and entertainment. Many businesses are creating Internet sites as an integral part of their marketing efforts, informing consumers of the products or services offered by the business or providing other information seeking to engender brand loyalty. Many federal, state, and local government agencies are also employing Internet sites for informational purposes, particularly agencies which must interact with virtually all segments of society such as the Internal Revenue

Service and secretaries of state. Providing informational guides and/or searchable databases of online public records may reduce operating costs. Further, the Internet is becoming increasingly popular as a medium for commercial transactions.

Currently, the most commonly employed method of transferring data over the Internet is to employ the World Wide Web environment, also called simply "the Web". Other Internet resources exist for transferring information, such as File Transfer Protocol (FTP) and Gopher, but have not achieved the popularity of the Web. In the Web environment, servers and clients effect data transaction using the Hypertext Transfer Protocol (HTTP), a known protocol for handling the transfer of various data files (e.g., text, still graphic images, audio, motion video, etc.). The information in various data files is formatted for presentation to a user by a standard page description language, the Hypertext Markup Language (HTML). In addition to basic presentation formatting, HTML allows developers to specify "links" to other Web resources identified by a Uniform Resource Locator (URL). A URL is a special syntax identifier defining a communications path to specific information. Each logical block of information accessible to a client, called a "page" or a "Web page", is identified by a URL. The URL provides a universal, consistent method for finding and accessing this information, not necessarily for the user, but mostly for the user's Web "browser". A browser is a program capable of submitting a request for information identified by an identifier, such as, for example, a URL. A user may enter a domain name through a graphical user

interface (GUI) for the browser to access a source of content. The domain name is automatically converted to the Internet Protocol (IP) address by a domain name system (DNS), which is a service that translates the symbolic name entered by the user into an IP address by looking up the domain name in a database.

Vision impaired users of web often rely on tools, such as a talking web browser. An example of a talking web browser is the Home Page Reader (HPR), which is available from International Business Machines Corporation (IBM). HPR is a spoken on-ramp to the Information Highway for computer users who are blind or visually impaired. HPR provides web access by quickly, easily, and efficiently speaking web page information. HPR provides a simple, easy-to-use interface for navigating and manipulating Web page elements. Using the keyboard to navigate, a user who is blind or who has a visual impairment can hear the full range of web page content provided in a logical, clear, and understandable manner.

In perceptual psychology, a notion of gestaltic comprehension is present in which the perception is manifested by understanding the whole rather than analyzing small parts and combining them. For example, when a user views a Web page, a quick glance is all that it takes for the user to decide whether to read the web page. Often the quick glance is focused on the icons and/or pictures and some heavily enlarged or bolded headlines in the web page. Unfortunately, with users who are blind, the gestaltic perception of the web page is more difficult. Part of this difficulty occurs because

speech is more sequential than vision.

The present invention recognizes that one problem with talking web browsers is that an overview of a page is unavailable because this type of web browser moves from topic to topic in a sequential manner. Therefore, it would be advantageous to have an improved method and apparatus for presenting a web page to a user who may be visually impaired.

SUMMARY OF THE INVENTION

The present invention provides a method, apparatus, and computer implemented instructions for audibly presenting a document in a data processing system. The document is parsed to identify a presence of a selected tag, wherein text is associated with the selected tag. Responsive to an identification of the presence of the selected tag, the text is audibly presented prior to presenting other text within the document.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

Figure 1 is a pictorial representation of a data processing system in which the present invention may be implemented in accordance with a preferred embodiment of the present invention;

Figure 2 is a block diagram of a data processing system in which the present invention may be implemented;

Figure 3 is a block diagram of a browser program in accordance with a preferred embodiment of the present invention;

Figure 4 is a diagram of a web page that may be presented in accordance with a preferred embodiment of the present invention;

Figure 5 is a diagram illustrating examples of tags used to identify an emphasis for text in a web page in accordance with a preferred embodiment of the present invention;

Figure 6 is a diagram of a web page received by a browser prior to presentation in accordance with a preferred embodiment of the present invention;

Figure 7 is a diagram of a list used to present text in accordance with a preferred embodiment of the present

invention;

Figure 8 is a flowchart of a process used for processing a web page in accordance with a preferred embodiment of the present invention; and

Figure 9 is a flowchart of a process used for presenting text in a list in accordance with a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the figures and in particular with reference to **Figure 1**, a pictorial representation of a data processing system in which the present invention may be implemented is depicted in accordance with a preferred embodiment of the present invention. A computer **100** is depicted which includes a system unit **110**, a video display terminal **102**, a keyboard **104**, storage devices **108**, which may include floppy drives and other types of permanent and removable storage media, and mouse **106**. Additional input devices may be included with personal computer **100**, such as, for example, a joystick, touchpad, touch screen, trackball, microphone, and the like. Computer **100** can be implemented using any suitable computer, such as an IBM RS/6000 computer or IntelliStation computer, which are products of International Business Machines Corporation, located in Armonk, New York. Although the depicted representation shows a computer, other embodiments of the present invention may be implemented in other types of data processing systems, such as a network computer. Computer **100** also preferably includes a graphical user interface that may be implemented by means of systems software residing in computer readable media in operation within computer **100**.

With reference now to **Figure 2**, a block diagram of a data processing system is shown in which the present invention may be implemented. Data processing system **200** is an example of a computer, such as computer **100** in

Figure 1, in which code or instructions implementing the processes of the present invention may be located. Data processing system **200** employs a peripheral component interconnect (PCI) local bus architecture. Although the depicted example employs a PCI bus, other bus architectures such as Accelerated Graphics Port (AGP) and Industry Standard Architecture (ISA) may be used. Processor **202** and main memory **204** are connected to PCI local bus **206** through PCI bridge **208**. PCI bridge **208** also may include an integrated memory controller and cache memory for processor **202**. Additional connections to PCI local bus **206** may be made through direct component interconnection or through add-in boards. In the depicted example, local area network (LAN) adapter **210**, small computer system interface SCSI host bus adapter **212**, and expansion bus interface **214** are connected to PCI local bus **206** by direct component connection. In contrast, audio adapter **216**, graphics adapter **218**, and audio/video adapter **219** are connected to PCI local bus **206** by add-in boards inserted into expansion slots. Expansion bus interface **214** provides a connection for a keyboard and mouse adapter **220**, modem **222**, and additional memory **224**. SCSI host bus adapter **212** provides a connection for hard disk drive **226**, tape drive **228**, and CD-ROM drive **230**. Typical PCI local bus implementations will support three or four PCI expansion slots or add-in connectors.

An operating system runs on processor **202** and is used to coordinate and provide control of various components within data processing system **200** in **Figure 2**. The operating system may be a commercially available operating

system such as Windows 2000, which is available from Microsoft Corporation. An object oriented programming system such as Java may run in conjunction with the operating system and provides calls to the operating system from Java programs or applications executing on data processing system **200**. "Java" is a trademark of Sun Microsystems, Inc. Instructions for the operating system, the object-oriented programming system, and applications or programs are located on storage devices, such as hard disk drive **226**, and may be loaded into main memory **204** for execution by processor **202.**

Those of ordinary skill in the art will appreciate that the hardware in **Figure 2** may vary depending on the implementation. Other internal hardware or peripheral devices, such as flash ROM (or equivalent nonvolatile memory) or optical disk drives and the like, may be used in addition to or in place of the hardware depicted in **Figure 2**. Also, the processes of the present invention may be applied to a multiprocessor data processing system.

For example, data processing system **200**, if optionally configured as a network computer, may not include SCSI host bus adapter **212**, hard disk drive **226**, tape drive **228**, and CD-ROM **230**, as noted by dotted line **232** in **Figure 2** denoting optional inclusion. In that case, the computer, to be properly called a client computer, must include some type of network communication interface, such as LAN adapter **210**, modem **222**, or the like. As another example, data processing system **200** may be a stand-alone system configured to be bootable without relying on some type of network communication interface,

whether or not data processing system **200** comprises some type of network communication interface. As a further example, data processing system **200** may be a personal digital assistant (PDA), which is configured with ROM and/or flash ROM to provide non-volatile memory for storing operating system files and/or user-generated data.

The depicted example in **Figure 2** and above-described examples are not meant to imply architectural limitations. For example, data processing system **200** also may be a notebook computer or hand held computer in addition to taking the form of a PDA. Data processing system **200** also may be a kiosk or a Web appliance. The processes of the present invention are performed by processor **202** using computer implemented instructions, which may be located in a memory such as, for example, main memory **204**, memory **224**, or in one or more peripheral devices **226-230**.

Turning next to **Figure 3**, a block diagram of a browser program is depicted in accordance with a preferred embodiment of the present invention. A browser is an application used to navigate or view information or data in a distributed database, such as the Internet or the World Wide Web.

In this example, browser **300** is a talking web browser, which may be implemented using the Home Page Reader HPR, which is available from International Business Machines Corporation (IBM). The processes of the present invention may be implemented within HPR.

As illustrated, browser **300** includes a user interface **302**, which includes both a graphical user

interface (GUI) and a "visually impaired interface". The GUI allows a normal user to interface or communicate with browser **300**, while the visually impaired interface provides a means for a visually handicapped user to navigate a web page. This visually impaired interface includes an interface that will recognize voice commands as well as commands input from a keyboard. This interface provides for selection of various functions through menus **304** and allows for navigation through navigation **306**. For example, menu **304** may allow a user to perform various functions, such as saving a file, opening a new window, displaying a history, and entering a URL. Navigation **306** allows for a user to navigate various pages and to select web sites for viewing. For example, navigation **306** may allow a user to see a previous page or a subsequent page relative to the present page. Preferences such as those illustrated in **Figure 3** may be set through preferences **308**.

Communications **310** is the mechanism with which browser **300** receives documents and other resources from a network such as the Internet. Further, communications **310** is used to send or upload documents and resources onto a network. In the depicted example, communication **310** uses HTTP. Other protocols may be used depending on the implementation. Documents that are received by browser **300** are processed by language interpretation **312**, which includes an HTML unit **314** and a JavaScript unit **316**. Language interpretation **312** will process a document for presentation on graphical display **318**, as well as through text-to-voice unit **320** for visually impaired

users. In particular, HTML statements are processed by HTML unit **314** for presentation while JavaScript statements are processed by JavaScript unit **316**. The processes of the present invention may be implemented within language interpretation **312** to identify tags having selected types of emphasis for early presentation for visually impaired users.

Graphical display **318** includes layout unit **322**, rendering unit **324**, and window management **326**. These units are involved in presenting web pages to a user based on results from language interpretation **312**.

Browser **300** is presented as an example of a browser program in which the present invention may be embodied. In this example, browser **300** may be used by both normal and visually impaired users. Browser **300** is not meant to imply architectural limitations to the present invention. Presently available browsers may include additional functions not shown or may omit functions shown in browser **300**. A browser may be any application that is used to search for and present content on a distributed data processing system. Browser **300** may be implemented using known browser applications, such Netscape Navigator, Microsoft Internet Explorer, and Home Page Reader. Netscape Navigator is available from Netscape Communications Corporation while Microsoft Internet Explorer is available from Microsoft Corporation.

Browser **300** will parse a web page to create a list of words from emphasized regions in the web page. This list will be presented to the user prior to the rest of the web page being presented to the user. The text

within the list provides a quick overview of the web page.

With reference now to **Figure 4**, a diagram of a web page that may be presented is depicted in accordance with a preferred embodiment of the present invention. Web page **400** is an example of a visually presented web page in which some text has more emphasis that other text. For example, line **402** provides the most emphasis with line **404** and **406** providing the next level of emphasis. In presenting web page **400** to a visually impaired user, browser **300** in **Figure 3** would initially read "Feeding Your Ostrich" in line **402** to the user in a first level of emphasis. Next, the text "What to feed your ostrich" in line **404** and the text "How to Feed Your Ostrich" in line **406** would be presented with a second level of emphasis. In this example, the second level of emphasis is less than the first level of emphasis. The level of emphasis, also referred to as an emphasis level, may be embodied using different factors. For example, the volume of the voice, the intonation of the voice, and the speed of presentation may be varied to change the level of emphasis. After these lines have been presented, then the user may select other regions associated with these lines for presentation. In this manner, the user is able to obtain an overview of the web page. In this example, the web page is an hypertext markup language (HTML) document. Of course the mechanism of the present invention may be applied to other types of documents, such as other markup language documents like extensible markup language (XML) documents.

Turning next to **Figure 5**, a diagram illustrating examples of tags used to identify an emphasis for text in a web page is depicted in accordance with a preferred embodiment of the present invention. Tag pairs **500**, **502**, **504**, and **506** are examples of tag pairs identified as encompassing text that is to be presented to a user to provide an overview of a document. Depending on the type of tag in the tag pair, a different emphasis level may be assigned to the text associated with the tag pair. For example, text associated with tag pair **506** may be presented using a higher emphasis level than text associated with tag pair **502**. Tag **508** is the opening tag in tag pair **506**, while tag **510** is the closing tag in tag pair **506**. Although tags are used in these examples to associate emphasis levels other mechanisms also may be used.

Turning now to **Figure 6**, a diagram of a web page received by a browser prior to presentation is depicted in accordance with a preferred embodiment of the present invention. Web page **600** is an example of web page **400** in **Figure 4** prior to presentation on a display by a browser, such as browser **300** in **Figure 3**. In this example, lines **602**, **604**, and **606** are audibly presented to the user prior to other portions being presented to the user. In the depicted examples, lines **602** includes the tags "<H1> </H2>". Line **604** includes the tags "<H2> </H2>", while line **606** contains the tags "<H2> </H2>". Based on the tags, the text associated with line **602** is provided more emphasis than text associated with line **604** and line **606**.

With reference now to **Figure 7**, a diagram of a list used to present text is depicted in accordance with a preferred embodiment of the present invention. List **700** contains entries **702**, **704**, and **706**. These entries correspond to the text in web page **400** in **Figure 4** and web page **600** in **Figure 6**, which are audibly presented to a user. Each entry includes text and an emphasis level that is to be used to present the text in the entry. Although in the depicted examples, text is placed in a list in association with emphasis levels, other data structures may be used other than a list. For example, the text and associated emphasis levels may be stored in a database.

Each time the mechanism of the present invention identifies a selected tag that is to be presented, the text associated with that tag is placed in list **700**. In these examples, the selected tag is a particular opening tag for text. The opening tag is the first tag in a pair of tags encountered in association with text. The amount of text that is to be placed in the list is defined by the closing tag, which is the tag appearing at the end of the text in association with the opening tag. Further, although the emphasis levels are ranked by numbers, any other mechanism for ordering emphasis levels may be used.

Turning now to **Figure 8**, a flowchart of a process used for processing a web page is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 8** may be implemented in a browser, such a browser **300** in **Figure 3**.

The process begins by receiving a web page (step **800**). The web page is then parsed for tags (step **802**).

Next, a determination is made as to whether a selected tag has been found (step **804**). The type of tag that identifies text for early presentation may differ depending on the particular implementation. The selected tag may include those found such as those found in **Figure 5**. If the selected tag is found, the text associated with the selected tag is added to the list with an emphasis level (step **806**). This list may be implemented using list **700** in **Figure 7**. In the depicted examples, the selected tag in an opening tag in a tag pair. The text associate with the selected tag is identified as the text between the selected tag and the closing tag in the tag pair.

A determination is then made as to whether there are more tags in the document (step **808**). If additional tags are absent, the list is presented to the user (step **810**) with the process terminating thereafter. Otherwise, the process returns to step **802** as described above.

With reference again to step **804**, if the selected tag is not found, the process proceeds to step **808** as described above.

Turning next to **Figure 9**, a flowchart of a process used for presenting text in a list is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 9** is a more detailed description of step **810** in **Figure 8**.

The process begins by retrieving an unpresented entry from a list (step **900**). The list may be implemented using a list similar to list **700** in **Figure 7**. The text in the entry is then presented using an

associated emphasis level (step **902**). Next, a determination is made as to whether there are more entries are present in the list (step **904**). If additional entries are not present within the list, the process terminates. Otherwise the process returns to step **900** as illustrated above.

Thus, the present invention provides a method, apparatus, and computer implemented instructions for early delivery of selected regions in a web page to a user. The mechanism of the present invention identifies text with an emphasis for early presentation based on the type of tag in the web page. When the entire web page has been processed, the text in the list is then audibly presented to the user. In this manner, an overview of a web page is provided to a visually impaired user. For example, the text could be presented in braille to the user.

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog communications links, wired or wireless communications

links using transmission forms, such as, for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded formats that are decoded for actual use in a particular data processing system.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art. For example, rather than placing the text in a list, the text could be presented as encountered within the web page. Further, the mechanism of the present invention may be applied to other types of documents other than a web page. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.